

Matthew S. Johnson
matthew.s.johnson@nasa.gov
NASA Ames Research Center
M/S 232-21
Moffett Field, CA 94035

ABSTRACT

Implementing Marine Organic Aerosols Into the GEOS-Chem Model

Marine-sourced organic aerosols (MOA) have been shown to play an important role in tropospheric chemistry by impacting surface mass, cloud condensation nuclei, and ice nuclei concentrations over remote marine and coastal regions. In this work, an online marine primary organic aerosol emission parameterization, designed to be used for both global and regional models, was implemented into the GEOS-Chem model. The implemented emission scheme improved the large under-prediction of organic aerosol concentrations in clean marine regions (normalized mean bias decreases from -79% when using the default settings to -12% when marine organic aerosols are added). Model predictions were also in good agreement (correlation coefficient of 0.62 and normalized mean bias of -36%) with hourly surface concentrations of MOA observed during the summertime at an inland site near Paris, France. Our study shows that MOA have weaker coastal-to-inland concentration gradients than sea-salt aerosols, leading to several inland European cities having > 10% of their surface submicron organic aerosol mass concentration with a marine source. The addition of MOA tracers to GEOS-Chem enabled us to identify the regions with large contributions of freshly-emitted or aged aerosol having distinct physicochemical properties, potentially indicating optimal locations for future field studies.